IN THE SPECIFICATION:

Please amend the specification as follows:

Please substitute the paragraph beginning at page 1, line 23, and ending on page 2, line 2, with the following.

A2 -- Conventionally, in the technical field which requires high-precision processing, various processing operations are done by setting an object to be processed on a stage which can be aligned at high precision, and controlling the stage. The prior art will be described by exemplifying a projection exposure apparatus used in the manufacture of a semiconductor device or the like. --

Please substitute the paragraph beginning at page 2, line 3, with the following.

A3 -- In the projection exposure apparatus, a reticle stage, which supports a reticle, or a wafer stage, which supports a wafer, must be moved parallel to planes perpendicular to each other along the X- and Y-axes in exposure, and the stage position must be accurately measured and controlled. For this purpose, the projection exposure apparatus uses a laser interferometer as a means for measuring the positions of X and Y strokes on the reticle or wafer stage in the μ order or less. --

Please substitute the paragraph beginning at page 3, line 2, with the following.

A4 -- Fig. 5 is a view showing a measurement principle using a laser interferometer. A bar mirror on an X-Y stage 12 is irradiated with a laser beam from the Y-axis direction, and

measurement is done by using the reflected beam. When either of the X and Y strokes is longer, for example, when the Y-axis stroke is longer, as shown in Fig. 5, a bar mirror for measuring an X-axis position inevitably becomes longer along the Y-axis. A long bar mirror makes the apparatus bulky. In addition, a cantilever structure generates deflection and vibrations of the bar mirror itself. --

Please substitute the paragraph beginning at page 5, line 8, and ending on page 6, line 14, with the following.

a5 -- The optical path until the reference beam is incident on the detector 10a is constant regardless of the position of the Y table 14. The optical path until the measurement beam is incident on the detector 10a depends on the Y-axis position of the bar mirror 11a on the X table 16 that reflects the measurement beam, and the measurement beam includes position information of the Y table 14. These optical paths are compared to measure a distance y between the optical unit (interferometer) 9a along the Y-axis and the bar mirror 11a at a point A where the bar mirror 11a held by the X table 16 reflects the measurement beam, and the position of the Y table 14. The other laser beam split by the beam splitter is split into two laser beams by another beam splitter. One of the split laser beams is directly guided to one of the optical units (interferometers) 9b and 9c, whereas the other is deflected in its optical path by another bender and guided to the other optical unit (interferometer). Each of the laser beams guided to the optical units (interferometers) 9b and 9c is split into reference and measurement beams. The measurement beams reciprocate twice between the optical units (interferometers) 9b and 9c and

the bar mirror 11b, and the reference beams are repetitively reflected within the respective optical units (interferometers) 9b and 9c. Then, the reference and measurement beams are guided to the detectors 10b and 10c. Distances x1 and x2 between the optical units (interferometers) 9b and 9c and the bar mirror 11b along the X-axis at points B and C where the bar mirror 11b held by the X table 16 reflects the laser beams, and the position of the X table 16 including the two points can be measured from the reference and measurement beams guided to the detectors 10b and 10c. --

Please substitute the paragraph beginning at page 10, line 17, and ending on page 11, line 9, with the following.

A6 -- A semiconductor device manufacturing method according to the present invention comprises the steps of installing manufacturing apparatuses for performing various processes, including the projection exposure apparatus, in a semiconductor manufacturing factory, and manufacturing a semiconductor device by using the manufacturing apparatuses in a plurality of processes. The method can further comprise the steps of connecting the manufacturing apparatuses by a local area network, and communicating information about at least one of the manufacturing apparatuses between the local area network and an external network outside the semiconductor manufacturing factory. A database provided by a vendor or user of the projection exposure apparatus can be accessed via the external network to obtain maintenance information of the manufacturing apparatus by data communication, or production management can be performed by data communication between the semiconductor manufacturing factory and another semiconductor manufacturing factory via the external network. --

Please substitute the paragraph beginning at page 11, line 10, with the following.

a7 -- A semiconductor manufacturing factory according to the present invention comprises manufacturing apparatuses for <u>performing</u> various processes, including the projection exposure apparatus, a local area network for connecting the manufacturing apparatuses, and a gateway which allows the local area network to access an external network outside the factory, wherein information about at least one of the manufacturing apparatuses can be communicated. --

Please substitute the paragraph beginning at page 12, line 3, with the following.

a8 -- Other objects and advantages besides those discussed above shall be apparent to those skilled in the art from the description of a preferred embodiment of the invention which follows. In the description, reference is made to accompanying drawings, which form ~~apart~~ <u>a part</u> thereof, and which illustrate an example of the invention. Such <u>an</u> example, however, is not exhaustive of the various embodiments of the invention, and therefore, reference is made to the claims which follow the description for determining the scope of the invention. --

Please substitute the paragraph beginning at page 14, line 18, and ending on page 15, line 4, with the following.

a9 -- Each linear motor 3 has movable and stationary elements 4 and 5 integrated into the reticle stage 1. The movable element 4 has a Y magnet (not shown) and <u>an</u> X magnet. The stationary element 5 has a plurality of Y coils 6 aligned along the Y-axis, and an X coil 7 as a single phase coil. The Y magnet faces the Y coils 6. A current flowing through a selected Y coil

6 allows the movable element 4 to obtain a driving force in the Y direction. If the two linear motors apply a driving force in a direction opposite to the Y direction, the reticle stage 1 can obtain a driving force in the θ-axis direction. The X ~~magnetic~~ magnet faces the X coil 7. A current flowing through the X coil 7 allows the movable element to obtain a driving force in the X direction. --

Please substitute the paragraph beginning at page 15, line 5, with the following.

a10 -- A laser interferometer is generally constituted by an optical unit which receives a laser beam from a light source, splits it into reference and measurement beams, ensures the optical path of the reference beam, and ~~cause~~ causes the reference and measurement beams to interfere with each other, a bar mirror for reflecting the measurement beam, a detector for detecting the interference beam, and the like. --

Please substitute the paragraph beginning at page 19, line 14, with the following.

a11 -- The X-axis position of the reticle stage 1 is obtained from x1 and x2, but their average may be used as the X-axis position of the reticle stage 1. Similarly, the Y-axis position of the reticle stage 1 is obtained from y1 and y2, but their average may be used as the Y-axis position of the reticle stage 1. The θ-axis position of the reticle stage 1 is obtained from the positions x1 and x2 and the beam span, but is also to be obtained from the positions y1 and y2 and the beam span. Thus, θ-direction position information measured by the two methods may be averaged. --

Please substitute the paragraph beginning at page 21, line 18, and ending on page 22, line 2, with the following.

a12 -- To the contrary, in the embodiment of Fig. 1, the optical units (interferometers) are mounted on the stage. Even if the atmosphere fluctuates between the laser heads 8c and 8d and the optical units (interferometers) 9c and 9d, the measurement result is hardly influenced. This is because an optical path common to the reference and measurement beams is formed between the laser heads 8c and 8d and the optical units (interferometers) 9c and 9d (in other words, the optical path of the interference beam of the reference and measurement beams is formed between the laser heads 8c and 8d and the optical units (interferometers) 9c and 9d). --

Please substitute the paragraph beginning at page 28, line 11, with the following.

a13 -- The X-axis position of the X table 16 is obtained from x1 and x2, but their average may be used as the X-axis position of the X table 16. Similarly, the Y-axis position of the Y table 14 is obtained from y1 and y2, but their average may be used as the Y-axis position of the Y table 14. The θ-axis position of the X table 16 is obtained from the positions x1 and x2 and the beam span, but is also to be obtained from the positions y1 and y2 and the beam span. Thus, θ-direction position information measured by the two methods may be averaged. --

Please substitute the paragraph beginning at page 29, line 14, and ending on page 30, line 13, with the following.

a14 -- To measure the X-axis position of the X table 16 by using the bar mirror 11c, the optical units (interferometers) 9c and 9d each for splitting a laser beam into reference and measurement beams and ensuring that the optical path of the reference beam may not be mounted on the X table 16 but may be arranged outside the stage. In this case, the X table 16 is equipped with an optical element for irradiating the bar mirror 11c with a measurement beam from the optical unit (interferometer) that is incident from the Y-axis direction, and returning a measurement beam from the X-axis direction that is reflected by the bar mirror 11c to the optical unit (interferometer). In this arrangement, however, the optical path of the measurement beam is long, and a fluctuation in the atmosphere around the optical path caused by a temperature change generates a large measurement error. That is, the measurement result is readily influenced by the fluctuation because the optical path until the reference beam is incident on the detector is constant, but the measurement beam split by the optical unit (interferometer) arranged outside the X table 16 reaches the optical element mounted on the X-table via a long-stroke optical path along the Y-axis, is reflected by the mark mirror 11c to return to the optical element again, and reaches the optical unit via the long-stroke optical path along the Y-axis. --

Please substitute the paragraph beginning at page 36, line 2, with the following.

a15 -- A production system for producing a semiconductor device (e.g., a semiconductor chip such as an IC or LSI, a liquid crystal panel, a CCD, a thin-film magnetic head, a micromachine, or the like) will be exemplified. A trouble remedy or periodic maintenance of a manufacturing apparatus installed in a semiconductor manufacturing factory, or maintenance service such as

software distribution is performed by using, e.g., a computer network outside the manufacturing factory. --

Please substitute the paragraph beginning at page 36, line 11, and ending on page 37, line 6, with the following.

-- Fig. 7 shows the overall system cut out at a given angle. In Fig. 7, reference numeral 101 denotes a business office of a vendor (e.g., an apparatus supply manufacturer), which provides a semiconductor device manufacturing apparatus. Assumed examples of the manufacturing apparatus are semiconductor manufacturing apparatuses for performing various processes used in a semiconductor manufacturing factory, such as pre-process, and apparatuses (e.g., a lithography apparatus including an exposure apparatus, a resist processing apparatus, and an etching apparatus, an annealing apparatus, a film formation apparatus, a planarization apparatus, and the like) and post-process apparatuses (e.g., an assembly apparatus, an inspection apparatus, and the like). The business office 101 comprises a host management system 108 for providing a maintenance database for the manufacturing apparatus, a plurality of operation terminal computers 110, and a LAN (Local Area Network) 109, which connects the host management system 108 and computers 110 to build an intranet. The host management system 108 has a gateway for connecting the LAN 109 to Internet 105 as an external network of the business office, and a security function for limiting external ~~accesses~~ access. --

Please substitute the paragraph beginning at page 37, line 7, and ending on page 38, line 18, with the following.

A17 -- Reference numerals 102 to 104 denote manufacturing factories of the semiconductor manufacturer as users of manufacturing apparatuses. The manufacturing factories 102 to 104 may belong to different manufacturers or the same manufacturer (e.g., a pre-process factory, a post-process factory, and the like). Each of the factories 102 to 104 is equipped with a plurality of manufacturing apparatuses 106, a LAN (e.g., a Local Area Network) 111, which connects these apparatuses 106 to construct an intranet, and a host management system 107 serving as a monitoring apparatus for monitoring the operation status of each manufacturing apparatus 106. The host management system 107 in each of the factories 102 to 104 has a gateway for connecting the LAN 111 in the factory to the Internet 105 as an external network of the factory. Each factory can access the host management system 108 of the vendor 101 from the LAN 111 via the Internet 105. The security function of the host management system 108 authorizes access of only a limited user. More specifically, the factory notifies the vendor via the Internet 105 of status information (e.g., the symptom of a manufacturing apparatus in trouble) representing the operation status of each manufacturing apparatus 106, and receives response information (e.g., information designating a remedy against the trouble, or remedy software or data) corresponding to the notification or maintenance information such as the latest software or help information. Data communication between the factories 102 to 104 and the vendor 101 and data communication via the LAN 111 in each factory adopt a communication protocol (TCP/IP) generally used in the Internet. Instead of using the Internet as an external network of the factory,

a dedicated network (e.g., <u>an</u> ISDN) having high security, which inhibits access of a third party, can be adopted. Also, the user may construct a database in addition to the one provided by the vendor and set the database on an external network, and the host management system may authorize access to the database from a plurality of user factories. --

Please substitute the paragraph beginning at page 38, line 19, and ending on page 40, line 10, with the following.

A18 -- Fig. 8 is a view showing the concept of the overall system of this embodiment that is cut out at a different angle from Fig. 7. In the above example, a plurality of user factories having manufacturing apparatuses and the management system of the manufacturing apparatus vendor are connected via an external network, and production management of each factory or information of at least one manufacturing apparatus is communicated via the external network. In the example of Fig. 8, a factory having apparatuses of a plurality of vendors and the management systems of the vendors for these manufacturing apparatuses are connected via the external network of the factory, and maintenance information of each manufacturing apparatus is communicated. In Fig. 8 reference numeral 201 denotes a manufacturing factory of a manufacturing apparatus user (<u>e.g., a</u> semiconductor device manufacturer) where manufacturing apparatuses for <u>performing</u> various processes, e.g., an exposure apparatus 202, <u>a</u> resist processing apparatus 203, and <u>a</u> film formation apparatus 204 are installed in the manufacturing line of the factory. Fig. 8 shows only one manufacturing factory 201, but a plurality of factories are networked in practice. The respective apparatuses in the factory are connected to a LAN ~~2060~~

206 to build an intranet, and a host management system 205 manages the operation of the manufacturing line. The business offices of vendors (e.g., apparatus supply manufacturers) such as an exposure apparatus manufacturer 210, a resist processing apparatus manufacturer 220, and a film formation apparatus manufacturer 230 comprise host management systems 211, 221, and 231 for executing remote maintenance for the supplied apparatuses. Each host management system has a maintenance database and a gateway for an external network, as described above. The host management system 205 for managing the apparatuses in the manufacturing factory of the user, and the management systems 211, 221, and 231 of the vendors for the respective apparatuses are connected via the Internet or dedicated network serving as an external network 200. If ~~a~~ trouble occurs in any one of a series of manufacturing apparatuses along the manufacturing line in this system, the operation of the manufacturing line stops. This trouble can be quickly solved by remote maintenance from the vendor of the apparatus in trouble via the Internet 200. This can minimize ~~stop~~ stoppage of the manufacturing line. --

Please substitute the paragraph beginning at page 40, line 11, and ending on page 41, line 16, with the following.

a19 -- Each manufacturing apparatus in the semiconductor manufacturing factory comprises a display, a network interface, and a computer for executing network access software and apparatus operating software, which are stored in a storage device. The storage device is a built-in memory, a hard disk, or a network file server. The network access software includes a dedicated or general-purpose web browser, and provides a user interface having a window as shown in Fig.

9 on the display. While referring to this window, the operator who manages the manufacturing apparatuses in each factory inputs, in input items on the windows, pieces of information such as the type of manufacturing apparatus (401), serial number (402), subject of trouble (403), occurrence date (404), degree of urgency (405), symptom (406), remedy (407), and progress (408). The pieces of input information are transmitted to the maintenance database via the Internet, and appropriate maintenance information is sent back from the maintenance database and displayed on the display. The user interface provided by the web browser realizes hyperlink functions (410 to 412), as shown in Fig. 9. This allows the operator to access detailed information of each item, receive the latest-version software to be used for a manufacturing apparatus and from a software library provided by a vendor, and receive an operation guide (help information) as a reference for the operator in the factory. Maintenance information provided by the maintenance database also includes information concerning the features of the present invention described above. The software library also provides the latest software for implementing the features of the present invention. --

Please substitute the paragraph beginning at page 41, line 17, and ending on page 42, line 16, with the following.

a20-- A semiconductor device manufacturing process using the above-described production system will be explained. Fig. 10 shows the flow of the whole manufacturing process of the semiconductor device. In step 1 (circuit design), a semiconductor device circuit is designed. In step 2 (mask formation), a mask having the designed circuit pattern is formed. In step 3 (wafer

manufacture), a wafer is manufactured by using a material such as silicon. In step 4 (wafer process) called a pre-process, an actual circuit is formed on the wafer by lithography using a prepared mask and the wafer. Step 5 (assembly), called a post-process, is the step of forming a semiconductor chip by using the wafer manufactured in step 4, and includes an assembly process (dicing and bonding) and a packing process (chip encapsulation). In step 6 (inspection), inspections such as the operation confirmation test and durability test of the semiconductor device manufactured in step 5 are conducted. After these steps, the semiconductor device is completed and shipped (step 7). For example, the pre-process and post-process are performed in separate dedicated factories, and maintenance is done for each of the factories by the above-described remote maintenance system. Information for production management and apparatus maintenance is communicated between the pre-process factory and the post-process factory via the Internet or dedicated network. --

Please substitute the paragraph beginning at page 42, line 17, and ending on page 42, line 10, with the following.

a2 -- Fig. 11 shows the detailed flow of the wafer process. In step 11 (oxidation), the wafer surface is oxidized. In step 12 (CVD), an insulating film is formed on the wafer surface. In step 13 (electrode formation), an electrode is formed on the wafer by vapor deposition. In step 14 (ion implantation), ions are implanted in the wafer. In step 15 (resist processing), a photosensitive agent is applied to the wafer. In step 16 (exposure) , the above-mentioned exposure apparatus exposes the wafer to the circuit pattern of a mask. In step 17 (developing),

the exposed wafer is developed. In step 18 (etching), the resist is etched except for the developed resist image. In step 19 (resist removal), an unnecessary resist after etching is removed. These steps are repeated to form multiple circuit patterns on the wafer. A manufacturing apparatus used in each step undergoes maintenance by the remote maintenance system, which prevents a trouble in advance. Even if a trouble occurs, the manufacturing apparatus can be quickly recovered. The productivity of the semiconductor device can be increased in comparison with the prior art. --